

# Use of Economic Capital for Performance Management

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**ERM Symposium – April 2008**

*Concurrent Session 1: Implementation and Uses of Economic Capital – CRO Panel*

# What is Economic Capital and Why is it Valuable?

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## Discussion Items

- Definition of Economic Capital (EC)
- Role of EC at ING
- EC as Performance Measurement & Management Tool
- Future Applications of EC in Performance Management

# Definition of Economic Capital (“EC”)

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***The amount of capital required to protect the market value of the liabilities within a 99.95% confidence interval based on shocks that could occur over a 1-year time horizon***

- Maximum loss approach within a confidence interval over one year is consistent with Solvency II
- 99.95% confidence interval consistent with AA rating, and more conservative than Solvency II minimum of 99.5%
- Market Value of Liabilities (“MVL”) is the value at which the liabilities could be transferred to a willing, rational, diversified counterparty in an arms’ length transaction and in an orderly manner
- The risk that is captured in the capital also relates to uncertainties beyond the 1-year period through the MVL

# Capital held for Risk Types that Correspond to Sources of Economic Loss

Financial risk	Credit & Transfer risk	Insurance risk	Operational risk	Business risk
<p>Changes in financial markets which would impact the market value of assets and liabilities (including options in assets and liabilities) from:</p> <ul style="list-style-type: none"> <li>• Interest rates</li> <li>• Equity prices</li> <li>• Real estate</li> <li>• Credit spreads</li> <li>• Implied vols</li> <li>• Currency rates</li> </ul>	<p>Changes in the credit quality of assets, reinsurance receivables and counterparties, including default.</p> <p>The recovery risk in case of default or loss of value due to migration.</p> <p>Transfer risk is related to the inability to repatriate or transfer shareholder value due to restrictions</p>	<p>Deviations from best estimate claims development, including size, frequency and timing of both level and long term trend, covering:</p> <ul style="list-style-type: none"> <li>• Mortality</li> <li>• Morbidity</li> <li>• Longevity risk</li> <li>• Property</li> <li>• Casualty</li> <li>• NATCAT</li> </ul>	<p>Unexpected events such as processing errors, fraud, systems failures, litigation, regulatory or compliance breaches, etc.</p>	<p>Deviations from best estimates on business expenses, lapses / persistency and future premium re-rating</p>

Carefully taking and managing these risks is how to create value



# Economic Capital is a more complete measure of Required Risk Capital

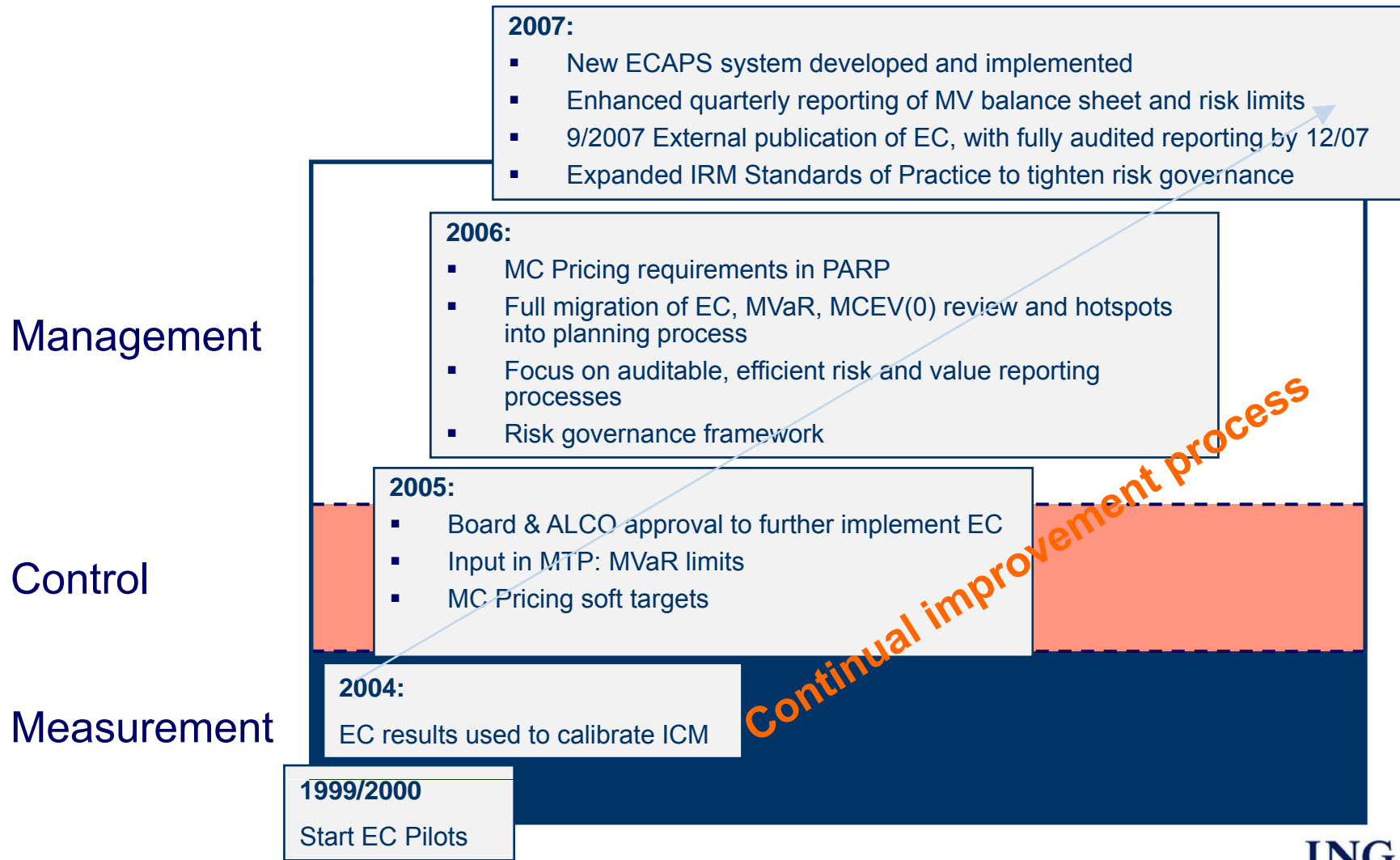
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- Aptly reflects the specific risks of the business
- Appropriately recognizes diversification
- Does not rely on market risk premiums to ensure solvency
- Captures risks not measured by RBC and Rating Agency models (e.g., business risk, market volatility, credit spreads)
- Reports and analyzes risks across all entities in holistic, consistent manner
- Explicitly incorporates commitment of our parent and diversification of risk available from worldwide operations

# EC/internal risk model supports the roles of ERM

	<b>Purpose</b>	<b>Examples</b>
<b>Risk Disclosure</b>	Risks and strategy are transparent to internal and external stakeholders to support an appropriate evaluation	<ul style="list-style-type: none"> <li>Investor disclosures – substantially improved in 07/08</li> <li>IFRS 7 Risk Paragraph</li> <li>Basis for Solvency II/QIS 4</li> </ul>
<b>Risk Strategy</b>	Delegated authorities are consistent with the overall Group strategy for profitable growth and the Group's risk appetite	<ul style="list-style-type: none"> <li>Establish Risk Appetite</li> <li>Strategic Planning: EC/limits/value metrics</li> <li>Capital Management &amp; Planning</li> </ul>
<b>Risk Reporting/Controlling</b>	Risk profile is transparent, e.g. “no surprises”, and consistent with authorities and limits delegated by the Group	<ul style="list-style-type: none"> <li>Risk Dashboard</li> <li>MVaR limit structure</li> <li>EC and MVS quarterly</li> <li>Innovative EC system ties to market risk analysis</li> </ul>
<b>Risk Underwriting</b>	Products and portfolios are structured, underwritten, priced, approved and managed appropriately	<ul style="list-style-type: none"> <li>PARP and NICARP for product approval of ins./inv. products</li> <li>SoPs/Guidelines</li> <li>Value metrics for new business-IRR and market consistent</li> </ul>

# EC/ERM requires continually improving Risk Measurement, Reporting and Management



# Adoption of EC supports Management to make better informed decisions

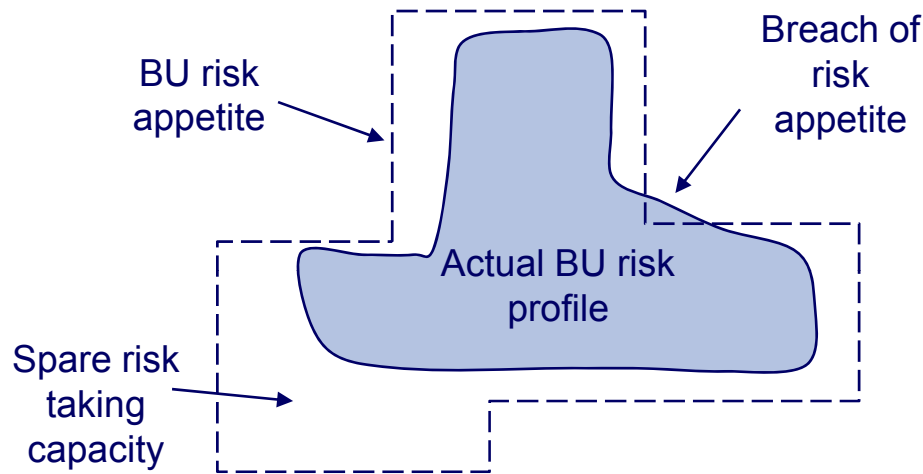
Management Aspect	Business Benefits
Capital Management	<ul style="list-style-type: none"> <li>• Optimizing the asset allocation strategies, both at product and aggregate level</li> <li>• Managing and allocating Group capital more efficiently, to maximize value creation</li> </ul>
Risk Management	<ul style="list-style-type: none"> <li>• Provides an improved understanding of risks to avoid costly mistakes</li> </ul>
Performance Measurement	<ul style="list-style-type: none"> <li>• Business is managed based on true underlying economics, management incentives are aligned to “Managing for Value” objectives and to develop strategies which create value and balance risk</li> </ul>
Product Management	<ul style="list-style-type: none"> <li>• Optimizing the business mix according to the value creation potential of products                             <ul style="list-style-type: none"> <li>• Different products become comparable under this framework, e.g., able to compare the profitability of a VA in the US and Japan, which up to now is very difficult due to differences in economic assumptions, risk profile, etc.</li> <li>• Improved definition of value is important to “Managing for Value”</li> </ul> </li> <li>• Implement value improvements to the in-force block of business</li> <li>• Pricing according to market consistent principles (i.e., a fair price for the risk taken)</li> </ul>

**Increased value creation leads to increased Total Shareholder Return**



# The Executive Board defines Risk Appetite

## Risk appetite sets boundaries...



- Actual risk profile is monitored against the risk appetite (in part through the dashboard)
  - The role of the business is to maximize value within these bounds
  - Group intervenes when there are material breaches
- Risk appetite is a core consideration in the strategic planning process

## ...across multiple dimensions


### Earnings at Risk (EaR) Capital at Risk (CaR)

- Based on stressed scenarios
- Risk management metrics presented in the Risk Dashboard

### Economic Capital

- Based on extreme stress scenarios
- Defines internal view of solvency capital requirements

# The Risk Dashboard summarizes risk position against risk appetite triggers

**ING**  Current risk profile  
-- Restatement 2006 Q4 --

## Earnings at Risk

Restatement 2006 Q4	MARKET RISKS							Non financial risks	Total	Earnings 06 (pre tax)	EaR / Earnings 2006
	Credit & transfer	Interest rate	Equity	Real Estate	FX	Insurance					
€ MM											
Total Wholesale								1,283	2,525	51%	
Total Retail								542	1,932	28%	
Total ING Direct								259	717	36%	
Corporate line (Bank)								25	(102)	NA	
<b>Total ING Bank</b>	1,226	288	49	274	21	-	251	2,110	5,072	42%	
Insurance Americas								281	1,992	14%	
Insurance Asia Pacific								140	621	23%	
Insurance Europe								485	2,328	21%	
Corporate line (Insurance)								108	(55)	NA	
<b>Total ING Insurance</b>	107	79	100	378	146	44	169	1,014	4,886	21%	
<b>Total ING Group</b>	<b>1,332</b>	<b>367</b>	<b>149</b>	<b>652</b>	<b>167</b>	<b>44</b>	<b>420</b>	<b>3,123</b>	<b>9,958</b>	<b>31%</b>	

## Capital at Risk

Restatement 2006 Q4	MARKET RISKS							Non financial risks	Total	Available Financial Resources *	CaR / Available Financial Resources *
	Credit & transfer	Interest rate	Equity	Real Estate	FX	Insurance					
€ MM											
Total Wholesale								1,259			
Total Retail								591			
Total ING Direct								502			
Corporate line (Bank)								57			
<b>Total ING Bank</b>	1,252	451	176	293	63	-	176	2,410	25,822	9%	
Insurance Americas								1,346			
Insurance Asia Pacific								2,131			
Insurance Europe								1,642			
Corporate line (Insurance)								817			
<b>Total ING Insurance</b>	382	2,730	1,394	350	572	348	161	5,936	27,200	22%	
<b>Total ING Group</b>	<b>1,634</b>	<b>3,180</b>	<b>1,569</b>	<b>644</b>	<b>634</b>	<b>348</b>	<b>338</b>	<b>8,347</b>	<b>48,812</b>	<b>17%</b>	

### Traffic light trigger points

EaR expressed as % forecast earnings

CaR expressed as % AFR

	EaR LoBs	EaR Group	CaR Total
Red	100%	50%	40%
Amber	50%	40%	20%
Green	0%	0%	0%



# Risk Dashboard provides an overview of risks in the Group

## Role of the Risk Dashboard

- The dashboard allows the Executive Board to take strategic decisions using comparable risk measures
  - E.g. 1 unit of equity risk can be compared to 1 unit of insurance risk
- This is a powerful management tool
  - Allows risk vs. return trade-offs to be made
  - Shows how risk taking cascades through the Group
  - Aids in identifying “hotspots”
  - Ensures management focus is on more material risks/portfolios

## Practical use of the Risk Dashboard

- Risk metrics presented in the Risk Dashboard to the Executive Board on quarterly basis
- Key tool in monitoring the adherence of risk taking to the risk appetite
- Risk issues are an integral part of the strategic planning process
- Risk increasingly supporting strategic decision making, rather than simply being “budgeted”
- Dashboard will be audited and reported annually, as part of the normal IFRS disclosure process

# Implementing a similar approach to set US Risk Appetite and support decision-making process

## ING Group Risk Appetite

- EaR = % of Group forecast earnings
- CaR = % of Group available financial resources

- ING Group's risk appetite has been defined and is measured regularly
- Diversification between bank, insurance, risk factors and geographies is fully taken into account

## US Risk Appetite

- EaR = % of US forecast earnings
- CaR = % of US available financial resources

- EaR diversification approach between risk factors and business units needs to be developed
- The US risk appetite needs to be further defined
- The % of earnings and available financial resources the US can put at stake depends on the appetite of senior leaders for volatility in earnings and capital
- A high range is limited by the stated Group risk appetite

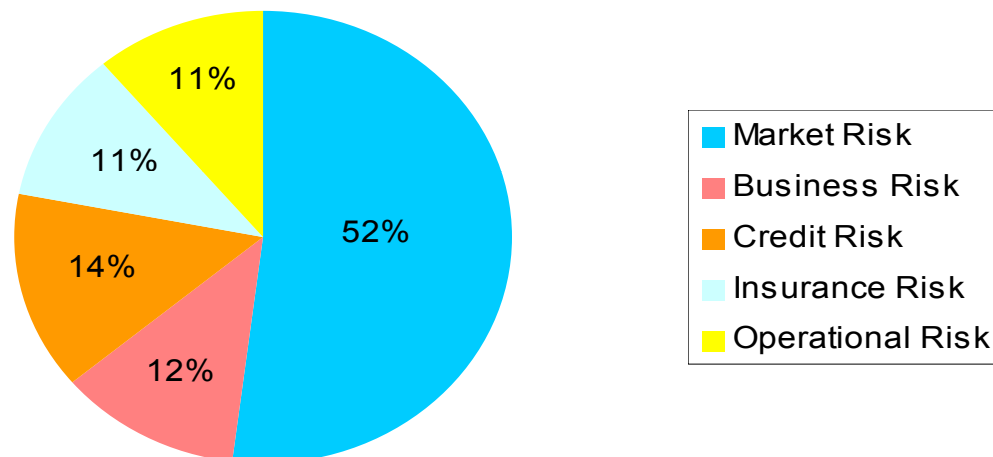
## Transaction approval:

- EaR vs. forecast earnings
- CaR vs. forecast earnings
- Within overall US risk appetite

- Develop criteria to evaluate major transactions/projects; streamline decision-making and approval process
- Minimum requirements for EaR/CaR vs forecast earnings
- Transactions can be added to the portfolio when the total risk appetite has not been breached;
- and when the US/BU is within its MVaR limit

# Example of EC approach within the Retail Life Business

- Largest element of EC is Market Risk, with risk of loss from movement in interest rates
- Success of ALM drives optimization of Market Risk EC
  - Consider out-of-the money hedges to limit tail risk



- Not optimum risk distribution for Life insurance business
- EC tools support direction for future management actions
  - Increase mortality exposure → “Term Strategy”
  - Reduce market risk exposure → Lengthen asset duration
  - Reduce market risk exposure → Reduce exposure to volatile asset types
  - Improve distribution of risk → Increase diversification benefit

# Future Expected Management Uses of EC as a Performance Management Tool

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- Pricing
  - Complexity of market consistent pricing
  - Volatility of EC results
  - Need to provide for regulatory capital
  - Evolution of methodology
- Compensation
  - Volatility of EC results
  - Lack of full understanding by senior leaders
  - Evolution of methodology

# Concluding Remarks

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- ING has been using Economic Capital approach internally for many years to support management decisions within ERM framework
- Use EC and market consistent techniques to manage business at all levels
  - Product design, pricing and approval
  - Setting risk/reward strategy
  - Risk, capital and value management and reporting
- EC framework is well suited for managing the business
  - Based on best-in-class models
  - Consistent with direction of Solvency II
  - Provides results we believe reflects the economics of the business
  - Provides appropriate incentives for capital and risk management

# Development of EC using Stress testing and linkage with capital management framework

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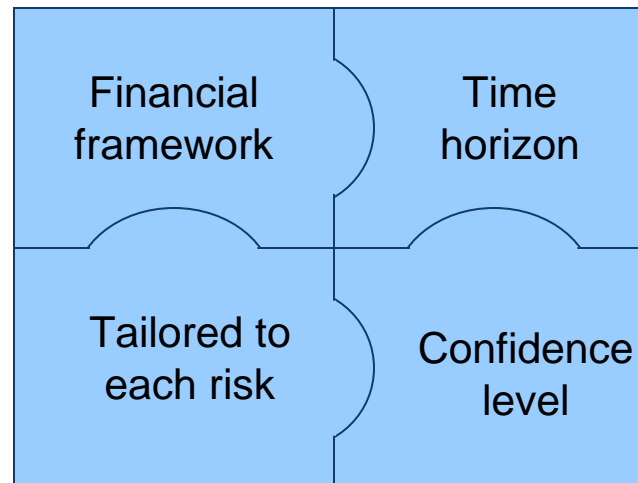
April 15, 2008  
Concurrent Session 1: Implementation and Uses of Economic Capital

The views expressed in this presentation are those of the presenter and do not represent the views of Ameriprise Financial, Inc.

# Key technical elements of the EC measurement framework

## Definition of Required Economic Capital (REC)

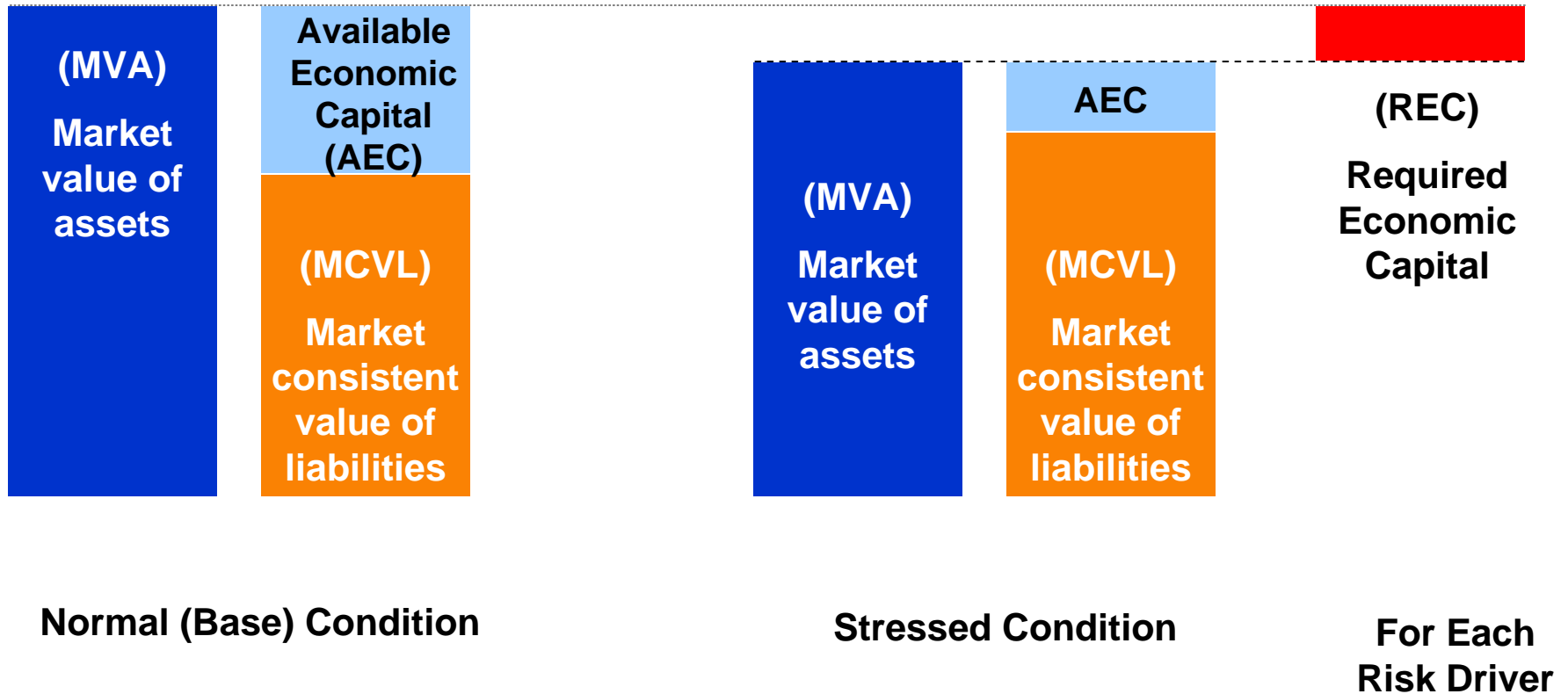
Amount of resources required to protect against **economic** insolvency due to changes in **value** over a specified time horizon and confidence interval



# The Financial Framework

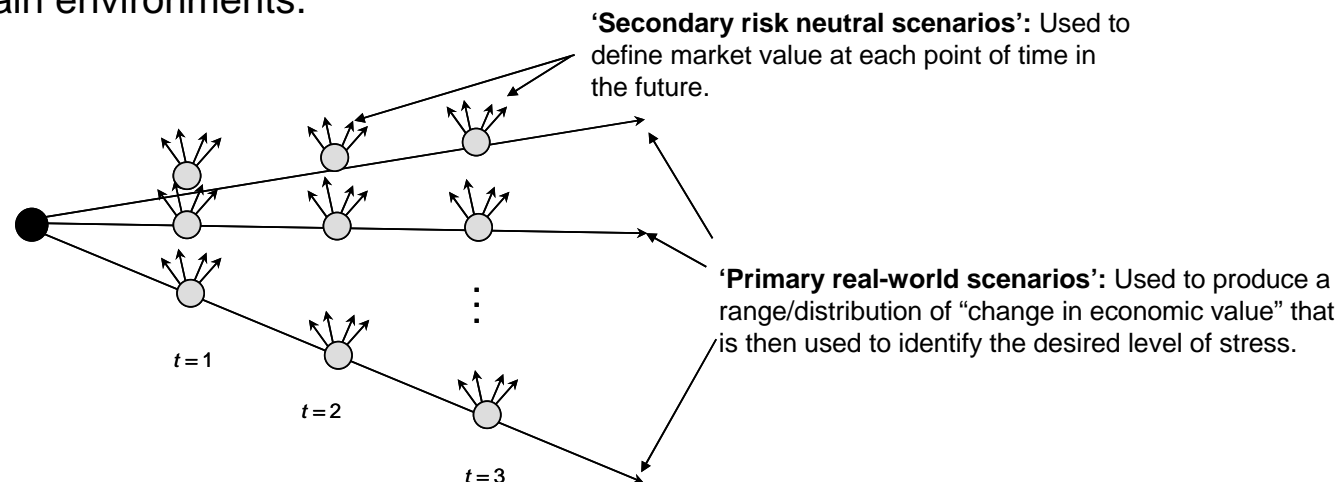
Determine Available Value

Determine Change (possible loss) in Value



# The rationale behind using a stress testing based approach

A **‘Pure’ Stochastic Simulation** approach would require stochastic-on-stochastic projections to estimate market values at future points of time across all real-world scenarios in order to construct a distribution of change in economic value. This is computationally “extremely” intense, possibly impractical in certain environments.



Some Alternatives pursued by others:

- **“Brute force”**: Run the embedded projection at each future time force. Impractical in some modeling environments.
- **Replicating portfolio** to map assets & liabilities to a small set of standard financial instruments, thereby reducing the time required to generate market value projections in the future.
- **Mathematical techniques** for estimation of future values (e.g. pre-generated 1000’s of “like” scenarios, matrices).

**Stress Testing Approach:** Apply a pre-determined level of real world stress, based on desired confidence level, to the normal (base) condition market value balance sheet to determine the change in value over the desired time horizon (one year). This approach is robust and it elegantly addresses the implementation difficulties of the pure stochastic simulation approach.

# Calculating required EC via stress testing: 4 stages to implementation

**Developing an economic view of the business**

Economic assessment of assets, liabilities and net available capital using risk neutral principles

**Identify key risks and determine level of stress to be applied**

Real world stress events for each key risk

**Apply stresses to the economic balance sheet**

Reassess value of assets, liabilities and net available capital under each risk stress

**Aggregate individual risk capital results, allowing for correlation effects**

Change in net available capital for each risk is the required economic capital (REC) for the risk.  
Total REC across risks for aggregate requirement

# The key risks that financial services firms may consider include:

## Risks

### Financial Risks

#### Market Risks

Equity Level

Equity Volatility

Interest Rates

Foreign Exchange

Property Price

Alternative Assets

#### Credit Risks

Default

Ratings Migration

Spread Volatility

Counterparty  
Concentration Risk

### Non-Financial Risks

#### Client Behavior

Exits

Utilization of  
Product Optionality

Expense Risk

Brand Risk  
(Catastrophic Client Exits)

#### Insurance /Underwriting

Mortality / Longevity

Morbidity

Property & Casualty

#### Operational Risk

People

Process

Systems

Regulatory

Legal

Strategic Risks

Subcategories for each include:

- Catastrophe
- Trend
- Parameter & mis-estimation

## How to determine the stressed conditions for each key risk driver?

### ❑ For each risk define the level of stress at the appropriate level of granularity

E.g. Credit risk for at individual rating by asset class level (AAA Credit card ABS). Possibly differentiate based on underlying collateral features/vintages (2006 vs. 2004)

### ❑ Historical data based techniques to define stress level

- Parametric approaches (e.g. 'Best fit' distributions)
- Interpolation techniques

### ❑ Expert judgment & analysis based if historical data availability is limited

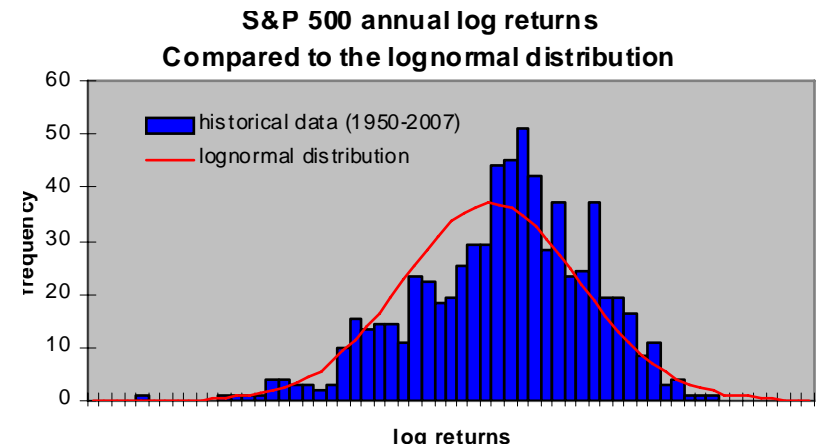
### ❑ Key points to consider when defining stress levels for any risk:

- Non-normality and rich set of fatter tail distributions
- Non linearity of dynamic functions (e.g. client behavior)
- Second order risks (e.g. convexity) and cross-greek effects
- Robust basis for judgments where “missing or lack” historical data
- Relevant historical time frame (e.g. regime changes)
- Relative vs. Absolute changes

# Example of Stressing Key Risks: Equity level and volatility

## Equity level stress

- ❑ Specific level shocks by equity index (S&P 500, EAFE, Russell) e.g. S&P 500: 30+% stress over 1 year
- ❑ Time period: Balance between relevant regime and statistically significant data points
- ❑ Distribution of results: Lognormal



## Equity volatility stress

- ❑ Extremely high degree of correlation between equity level stress and elevated equity volatility
  - 'Stressed' volatility is elevated volatility after 1 year equity level shock, not instantaneous short lived volatility peak
- ❑ Implied vs. historical realized volatility
- ❑ Full term structure of volatility (30 day to 10/15 year)
- ❑ Full Volatility surface (impractical for now)
- ❑ Build methodology to stress volatility despite very limited historical data on few points of the curve.



# Example of Stressing Key Risks: Interest rate levels

- ❑ A Company can use Principal Component Analysis (PCA) to derive their worst case yield curve movement
- ❑ One approach used to identify this worst case yield curve movement is to generate 10,000 real world yield curve movements using PCA and then calculate the resulting impact on the market value of assets and liabilities for all the 10,000 scenarios (e.g. nested simulation or estimation using key rate durations).
- ❑ Alternatively, a firm may choose to determine the targeted (99.x%) real world principle component stresses (3x2) and for each calculate required economic capital (REC)

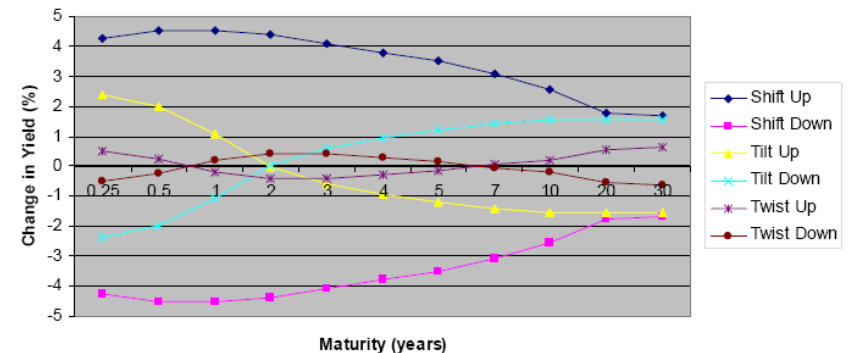
- The aggregate interest rate  $REC = \text{SQRT} (\text{MAX } PC_1^2 + \text{MAX } PC_2^2 + \text{MAX } PC_3^2)$

- ❑ PCA allows yield curve movements to be decomposed into their primary drivers

- Principal Component 1: Yield curve shifts
  - The most important movement is an upwards or downward shift in the whole yield curve
  - This typically explains over 70% of all yield curve movements
- Principal Component 2: Yield curve twist
  - Represents twisting of the yield curve (Around the 1 year rate)
  - This normally accounts for an additional 15-25% of the variance of the yield curve
- Principal Component 3: Yield curve inflection, bending or tilt
  - Additional principle components become less intuitive and explain less than 2% of movements

## Illustrative

Changes to Determine Interest Rate Stress Scenarios



## Aggregating results across risks for one business: The use of correlation matrices has been the dominant industry trend

### ☐ Correlation matrix

- By pair of tail risk events (e.g. equity level and interest rate level)
- In the tails, not average over time
- Based on historical data and expert judgment (where data is limited)
- Emerging as the best practice across the industry with increasing degree of convergence in the range of values across different users
- Correlation at the lowest level of risk drivers (sub-components of risk) not just between major risk categories (like equity, interest rate, credit)
- Test correlations by evaluating vs. specific scenarios with no assumed correlation
  - Historical extreme events like 1987 market crash, Russian default 1998, 2001, 2008
  - Hypothetical scenarios like inflation spike, increased leverage in the system widening spreads

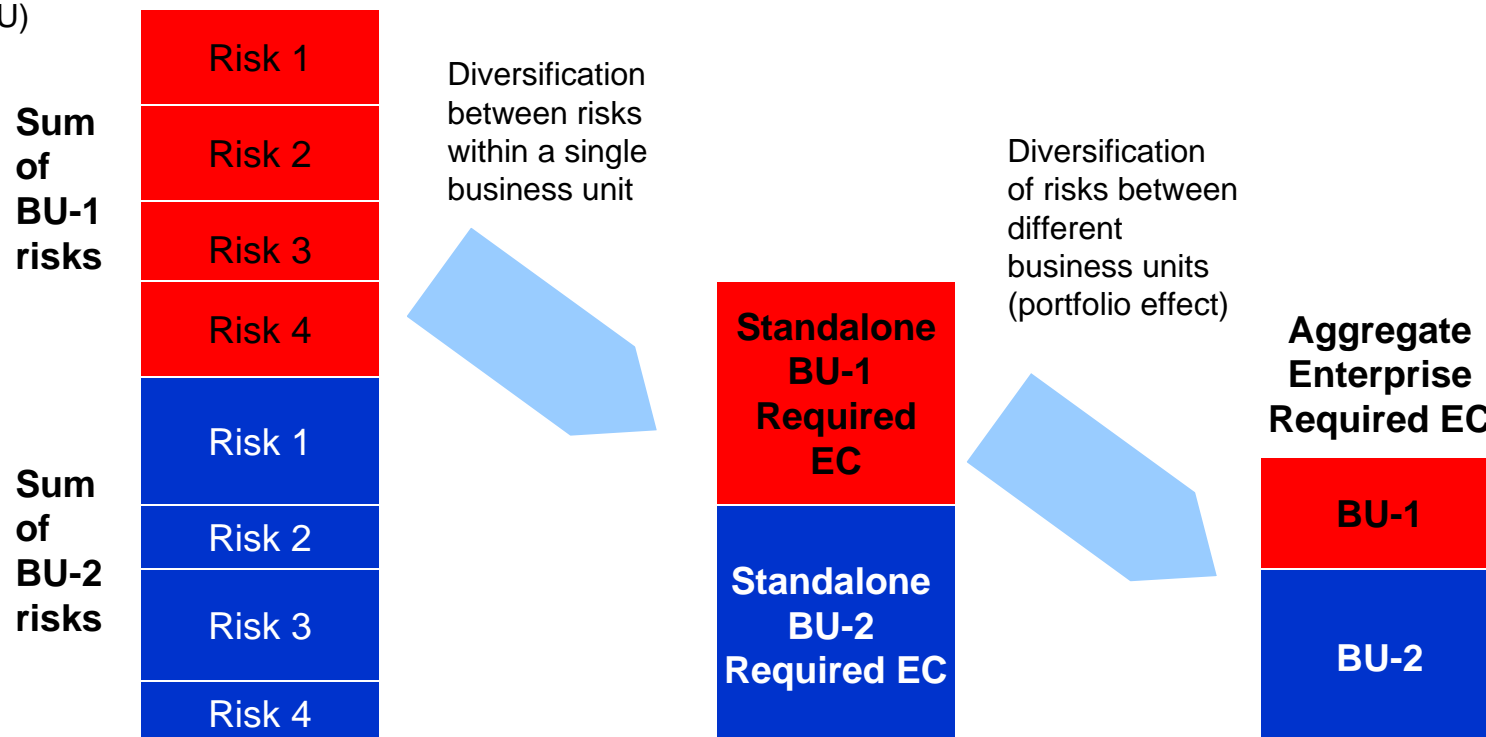
### ☐ Copula (a set of fitted correlation distributions)

- A newer practice. May be challenged by lack of data to fit distributions
- Can be difficult to explain results & business linkages to management

# Aggregating Results across businesses: One Enterprise View

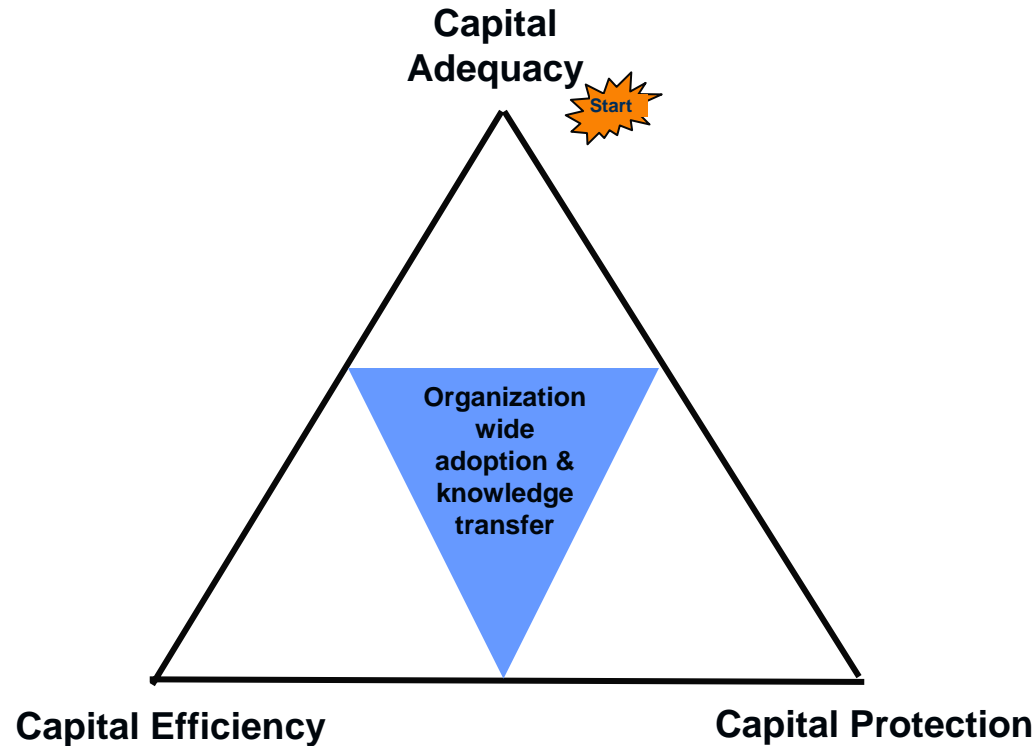
- ❑ The diversification between risks is captured with the risk correlation matrix
- ❑ Additionally diversification benefit is seen between business units due to portfolio effect. This can be quantified using an “in and out” type analysis.

Hypothetical illustration for two Business units (BU)



## Linkage of EC with capital management framework

- ❑ EC usually starts as a corporate initiative with a focus on assessing capital adequacy and planning.
- ❑ Subsequent applications embed the discipline down in the business units



# Evolution of usage for capital management

## Capital measurement

Introduction of risk sensitive measures of capital requirements at corporate level



- **First benefits: largely intangible insights into business steering**
- **Large scale risk avoidance can result in significant tangibles gains**
- **Business unit comparative profitability analysis**
- **Risk transfer optimization at the corporate level**



Pro-active approach to management of capital resources

## Capital management

Embedding of the risk capital metrics in the day-to-day business unit operations



- **Increasing uses in business units**
- **Business units realize implications of applying risk measurements**
- **Business units understand measures well enough to be able to plan using risk adjusted profitability**

# Evolution of usage for capital management

Application	Corporate vs. BU	Implementation horizon
Capital allocation and planning	Corporate	
Strategic risk management	Corporate	
ALM/ corporate investments	BU/ corporate	
Pricing	BU	
Product design	BU	
Risk transfer / mitigation strategy	Corporate/ BU	
Performance management	Corporate	
Executive compensation	Corporate	
External communication	Corporate	

 Short term

 Mid term

 Long term

The AIG logo is presented in a large, silver, three-dimensional serif font, enclosed within a thin silver rectangular border. This logo is centered on a dark blue background that features a faint, lighter blue world map. The map shows the outlines of continents, with the Americas on the left and Europe and Africa in the center.

**AIG**

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**2008 ERM Symposium**

**Implementation and Uses of Economic Capital – CRO Panel**

**April 15, 2008 Chicago**

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# AIG's Multi-Layered ERM Processes

Credit Risk Management

Market Risk Management

Gen Ins. Risk Management

Life Ins. Risk Management

Op. Risk Management

Liquidity Risk Management

- Each of the ERM functions focuses on systematic (non-diversifiable) risks
- Combination of centralized and decentralized processes that fit the business model
- Regional ERM hubs in North America, Asia and Europe
- Mature risk governance structure since early 90's
- ERM does not compensate for, but rather builds on, profit center RM
- Extensive use of "stress scenarios" that cut through all risk types (e.g. Pandemics)

AIG's corporate philosophy has always encouraged full profit center accountability for risk management – ERM has built on this unique risk culture

# ERM's "Enterprise" - Wide Focus

ERM's efforts "connect the dots" between each of the businesses' silo risk management processes to maximize economic value for shareholders

## Within & Between Segments

- ERM's focus has been on activities of an "aggregation" nature – e.g. economic capital, stress testing/catastrophic scenarios, consistent economic-based performance measurement, concentration risk management, reinsurance & risk mitigation (e.g. hedging) strategies, emerging risk management, etc.

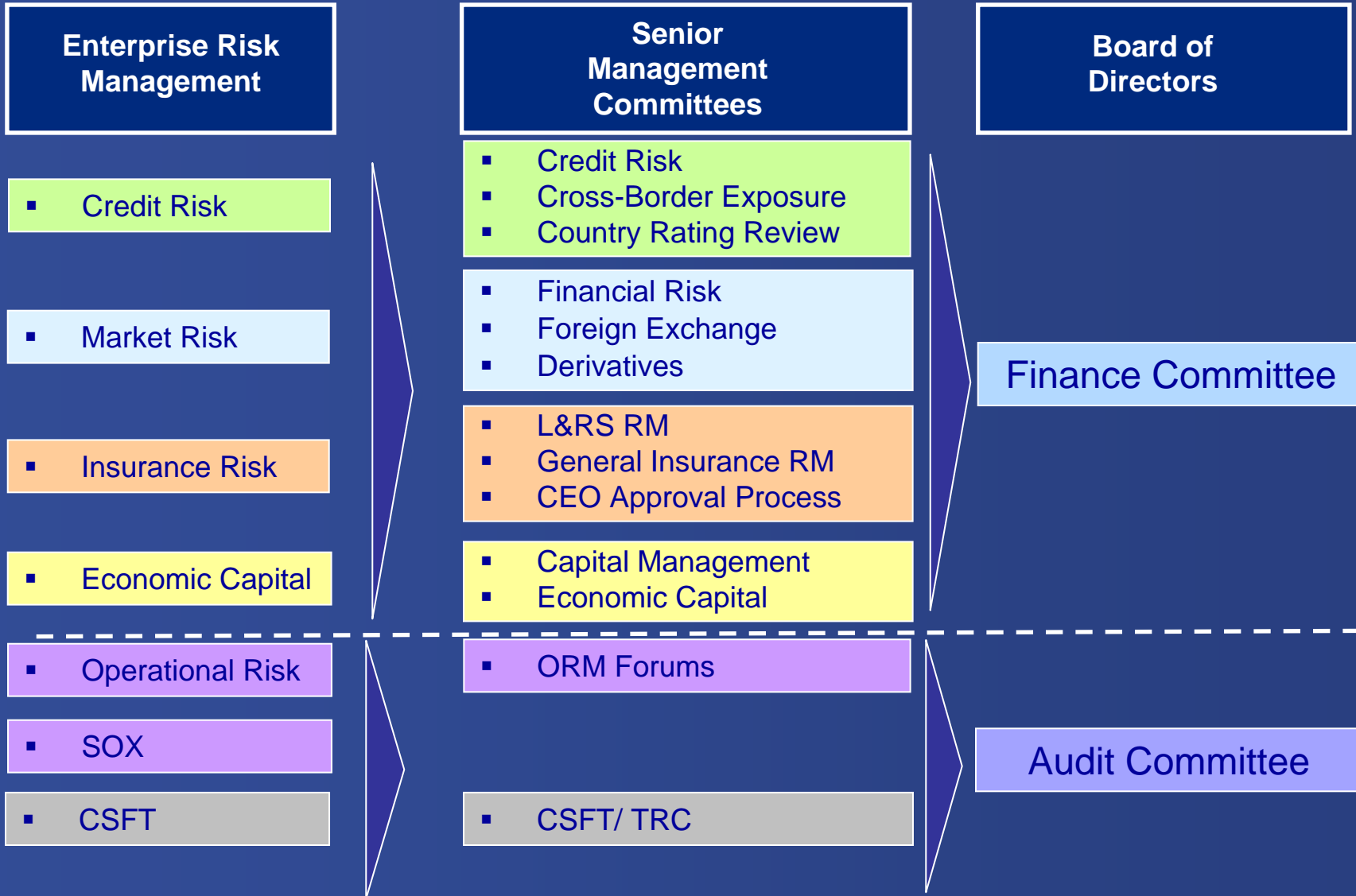
## "Pyramid" Risk Governance Structures

- Commencing with the Board and its Committees (e.g. Finance and Audit); cascading down to the four business segments, the regional/management subdivisions, the functional risk management committees (e.g. loss reserves) and the legal entity/profit center risk committees

## Three Pillar Approach

- ERM's Pillar 1 capital requirement approach is centered around the ECM and quantification of risk capital
- ERM's Pillar 2 supervisory review approach is guided by stress testing and the active dialogue with regulators and rating agencies
- ERM's Pillar 3 market discipline approach is demonstrated by regular risk based disclosures in the Form 10-K and 10-Q supplements and the enhanced disclosures to investors through the AIG website (e.g. sub-prime presentation and ECM Initiative update)

# ERM Governance and Reporting



# Rating Agencies

Four major rating agencies have indicated that they will, over time, incorporate ERM and ECM in the rating process.



“Standard & Poor’s is developing a process for evaluating the economic capital (EC) models of insurers with ERM programs that have been viewed as strong or excellent”

*S&P, Jan. 31, 2007*



*Moody's Investors Service*

“Moody's expects best practice insurers to develop economic capital models based on sound principles and conservative assumptions to reflect the risk profile of their businesses”

*Moody's, Mar. 22, 2007*



“Fitch believes reviewing insurers’ in-house models is a key part of capital analysis”  
“Prism provides a common ground to compare various insurers’ capital positions on a true economic basis”

*Fitch, Apr. 27 2007*



“A.M. Best will also expand the use of company-provided capital models in developing capital requirements within the rating evaluation process”

*A.M. Best, Mar. 5, 2007*

# S&P Endorses MCEV Reporting

*“We value the more meaningful information provided by [MC]EV-based measures because they more faithfully represent the underlying economics of the insurance portfolio, and enable us to dissect financial performance by new business contribution, experience deviations for all principal assumptions, and assumption changes.”*

Source: S&P RatingsDirect, October 15, 2007

## **Summary of S&P position:**

- Encourages MCEV as a global financial reporting standard
- Starting in 2008, will allow for capital relief based on internal MCEV models
- In favor of valuation via market consistent discounting plus margins
- Does not object to “day one” profits (and losses)
- Prefers going concern market consistent value rather than exit value

## **Disadvantages noted by S&P:**

- Recognizes that fair value reporting will add to volatility, but says that volatility is a reality of the business
- Fair value will require “huge” actuarial resources, adoption of new systems, and increasing administrative costs
- Insurers are worried that accelerated recognition of profits will accelerate taxation

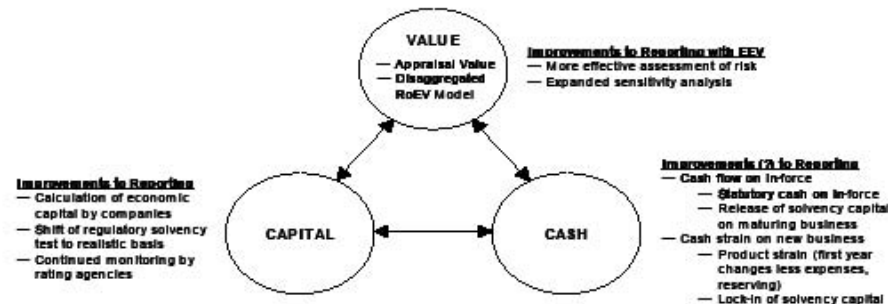
# European Analysts Favor Transparency of MCEV But Demand Whole Lot More



## What Investors Want – An Holistic View

- 'Group EV' disclosure — not just the covered business
- Tightly drawn market-consistent principles and sensitivity tests
- More detailed narrative between the creation of EV and its monetisation into cash
- In time, a single view of capital adequacy, auditable by analysts

### Value, Cash and Capital Considerations in an Insurance Company



Source: Citigroup Investment Research

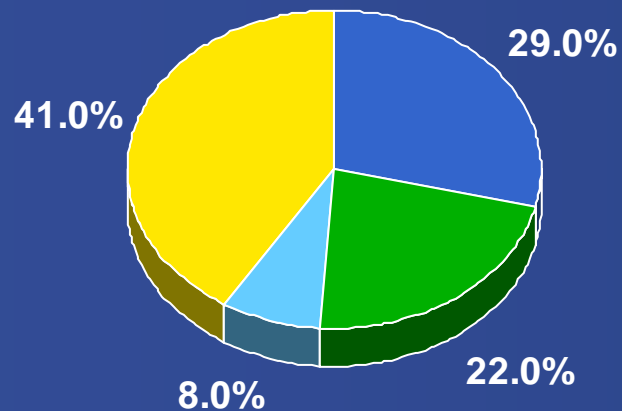
Citigroup Global Markets

Source: Citigroup Global Markets, "Valuation Crisis in Insurance – Can Better Disclosure Rescue the Sector?"; Sept. 17, 2007

# The Experience of European Insurers with US Operations

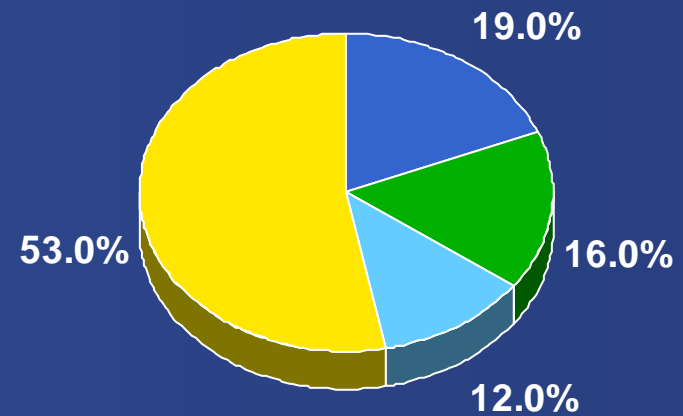
## European Insurers' New Business: Geographical Features<sup>1</sup>

### New Sales (APE)



US  
UK

### New Business Profits



Asia (ex Japan & Aust.)  
Other

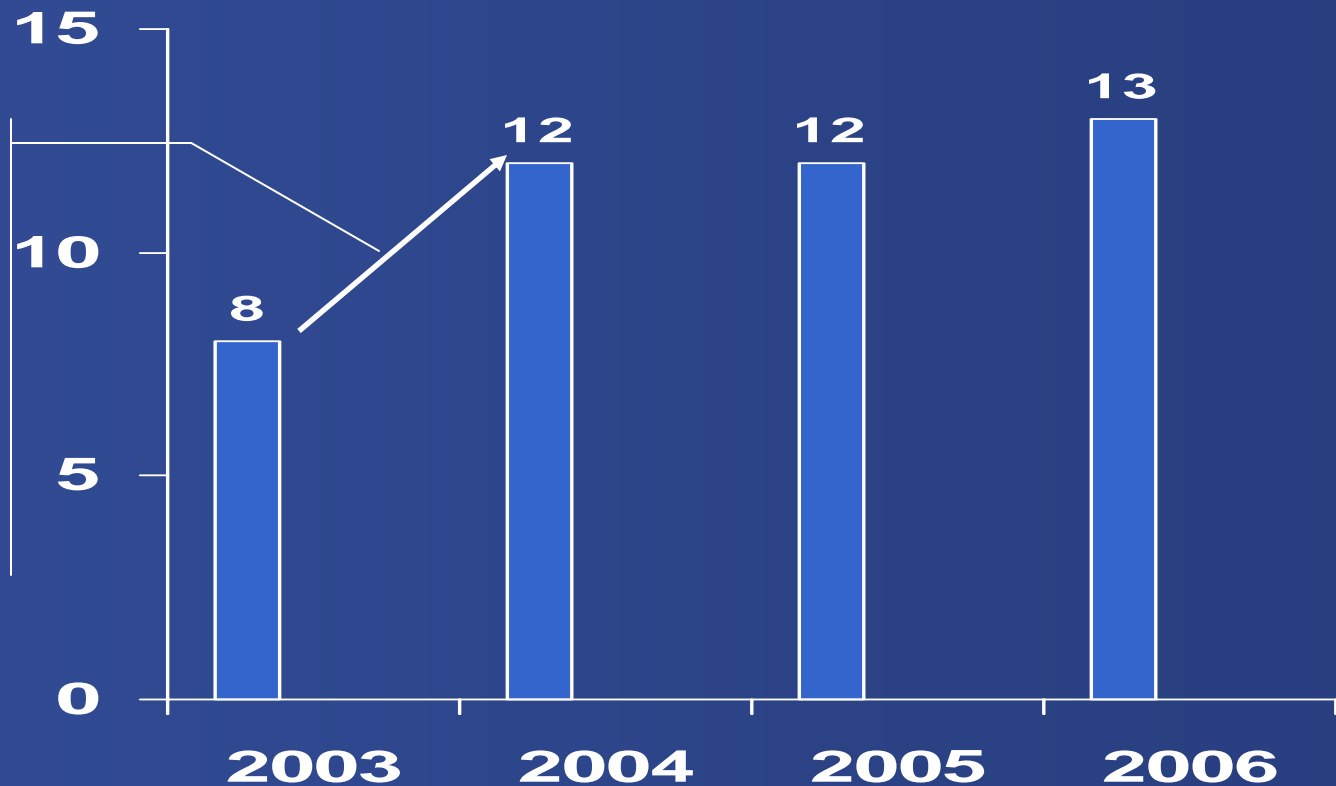
1. Includes: Aegon, Allianz, Aviva, Axa, ING, Old Mutual, Prudential (UK), ZFS

Source: Citigroup, European Embedded Value Review, June 28, 2007

# European Insurers Report Increasing Profit Margins Since EEV

## European Insurers' New Business Profit Margins<sup>1</sup> (NBP as % of New APE)

CFO Forum  
Launched EEV  
Principles in May  
2004, with  
implementation  
set for year end  
2005 at the latest



1. Includes: Aegon, Allianz, Aviva, Axa, ING, Old Mutual, Prudential (UK), ZFS

Source: Citigroup, European Embedded Value Review, June 28, 2007

# What's Driving AIG's Economic Capital and Risk Optimization

## Opportunity

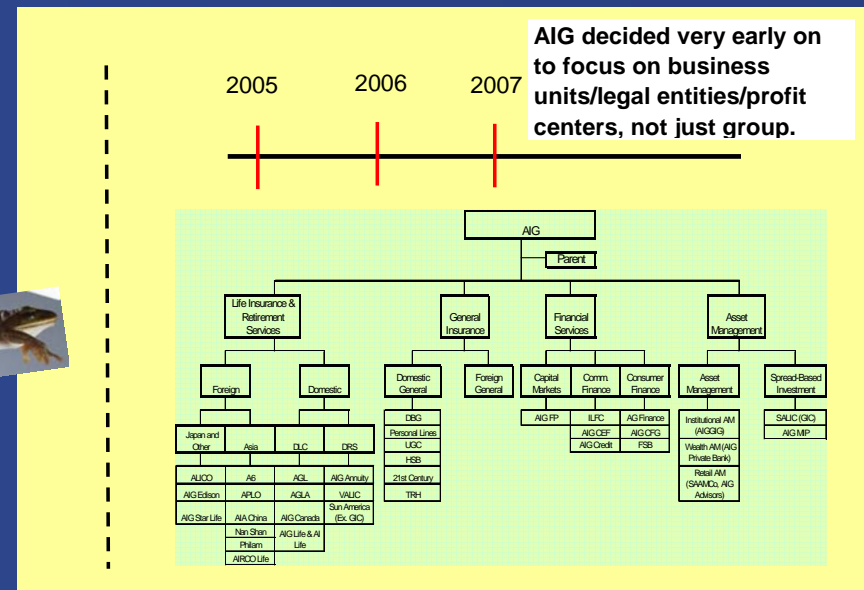
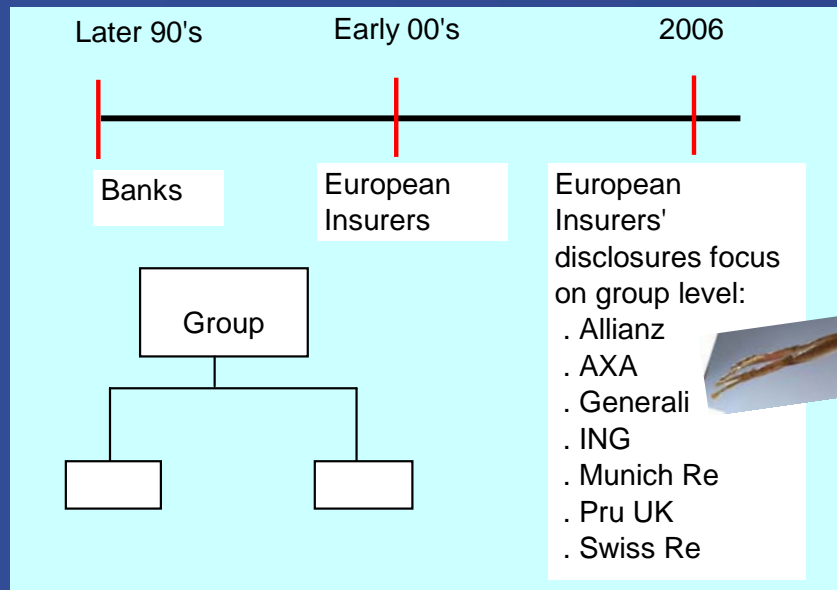
- Greater individual business unit risk retention / buy less reinsurance
- Increased operating efficiency / more financial flexibility
- More aggressive products evaluated on overall AIG portfolio risk effect vs. profit center
- Converge rating agency & economic views of excess capital positions
- Link management compensation to economic value creation

## Impact

- Higher growth and profitability
- Optimize net investment income and total return
- Higher ROE
- Higher margins
- Allows for more efficient redeployment of capital
- Optimization of cost of capital
- Allows measurement of risk adjusted business performance

# Economic Capital at AIG

By focusing on business applications, AIG's economic capital modeling has leapfrogged many of the traditional approaches to EC



## Important for

- Capital fungibility
- Regulatory capital dialogue
- Understanding business
- Performance metrics – “fit for purpose”

## AIG's Applications of EC

- *Optimization of Capital Structure – Hybrid Issuances & Share Repurchases;*
- *Assessment of alternative risk retention and reinsurance strategies for exposures to U.S. natural catastrophes ;*
- *Assessment of the economic costs/benefits of purchasing index-based excess of loss credit protection for portfolio of reinsurance recoverables;*
- *Evaluation of alternative asset allocation strategies taking account of regulatory constraints and economic considerations for our life insurance businesses operating in low-yield environments;*
- *Facilitation of active capital management processes for the life insurance segments by incorporating economic capital analysis for potential transactions;*
- *Assessment of capital mobility throughout the organization, developing principles and strategies to improve capital efficiency*

*Source: AIG Investor Relations Website; February 2008*

# CRO Forum Recommendations Re EC Time Horizon

- *“ There is a trade off between choosing a long time horizon (where portfolio characteristics far out from the valuation date can be brought into consideration in a more satisfactory way) and choosing a short time horizon (based on funding changes in market-consistent liability values over a one year time horizon).*
- *Market consistent liability valuations already take into account the lifetime of the business and associated risks. The traditional actuarial approach to risk modelling (i.e. choosing a long time horizon) comes at a cost – that of lower confidence in the calibration of parameters that far out into the future.*
- *The CRO Forum does not advocate one time horizon over another but rather believes that it should be appropriate to the business model and also the period of time over which management can deploy risk management strategies that can significantly impact the risk profile of the firm. Often running a model on more than one time horizon provides useful insight that is important for shaping enduring risk management or risk mitigation strategies.*
- *Nevertheless, the length of the period covering the worst-case loss should be longer than the risk measurement cycle of the company as measurement and decisions take time.*
- ***Since the CRO Forum supports market consistent models, for external capital adequacy assessment purposes, our preferred time horizon for losses is generally one year and assumes a quarterly risk management cycle.”***

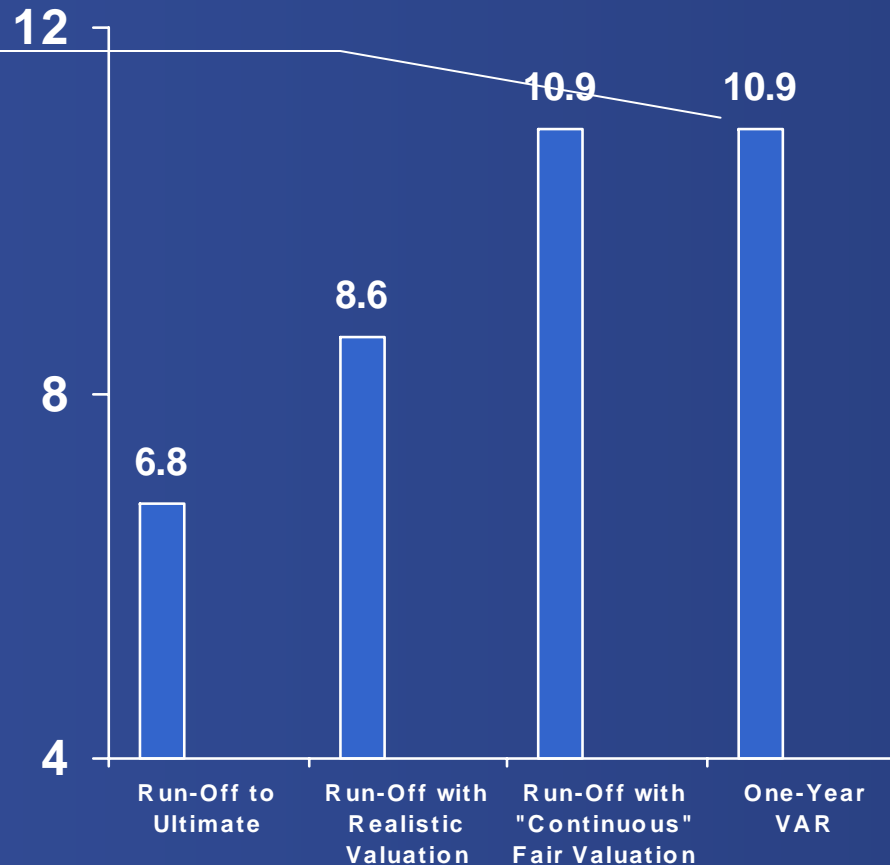
Source: CRO Forum, Response to A.M.Best “Draft: Risk Management and the Rating Process for Insurance Companies”; April 6, 2007

# Solvency Time Horizon : the Great Debate

## Case Study : UK Annuity Book with Credit Risky Cash flow Matching Strategy (Credit Composition = Globox Index)

RBC (95% CI Run-Off with 10 Year Duration or 99.5% One Year) as % of Fair Value of Liability

Case study dispels myth that One-Year VAR is an inferior risk measure to Run-Off measures



Source:

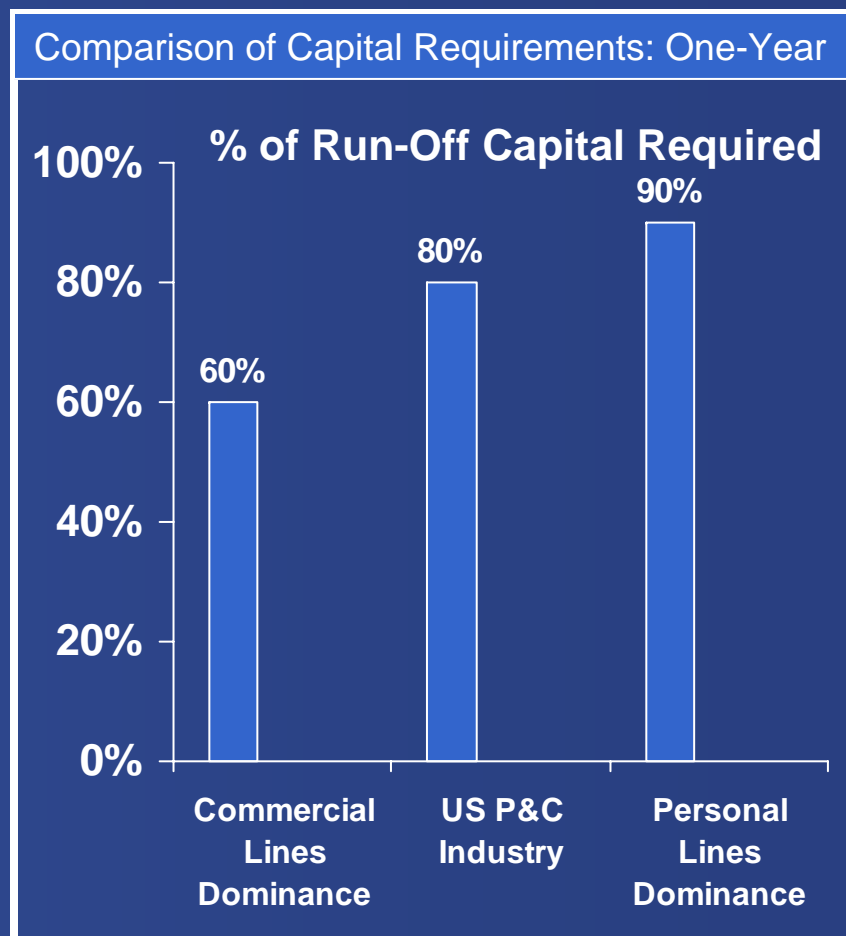
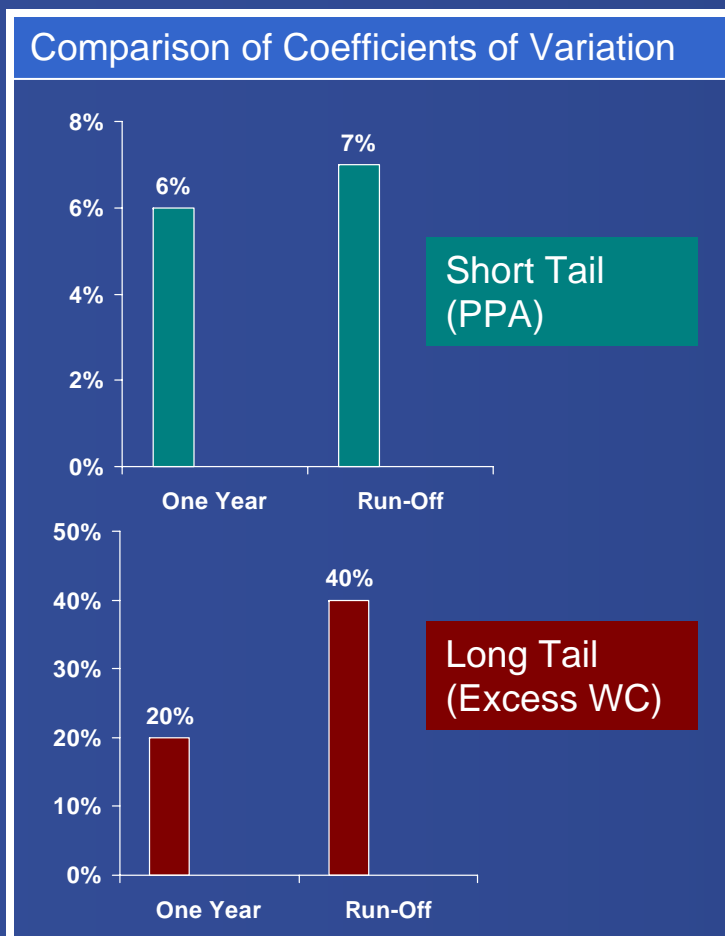
Barrie & Hibbert, September 2007, "Annuity Risk Management – The Impact of Intermediate Solvency on Risk Based Capital Requirements"

# Assessment of Financial Strength of P&C Insurers - Reserve Risk Required Capital : One-Year vs. Run-Off

Does use of a common (e.g. 5, 10, 30 year) projection period, result in an apples-to-apples comparison of financial strength of P&C insurers with vastly different run-off profiles?

Source : AIG Analysis of Schedule P Data as at Dec, 31, 2006

## - ILLUSTRATION -



# Risk Aggregation – Three Step Approach

AIG's ECM uses a three step approach for ensuring that "accumulations" of risk are robustly estimated

## Hybrid Approach in ECM

- Within risk types, aggregation is performed using consistent scenarios (e.g. the different components of market risk)
- Between risk types, risks are aggregated using a correlation matrix / copula approach to reflect the impact of "stress correlations" and increased interconnectedness of risks
- Some of the aggregations (e.g. between market and credit) are increasingly being performed using a consistent scenario approach

## Capital Mobility

- Insurance operations are regulated along legal entities by different jurisdictions with varying minimum risk based capital (RBC) requirements
- Restrictions on dividend payments to the parent and other capital flow constraints and tax considerations give rise to a further "fungibility haircut" to determine realizable diversification benefits

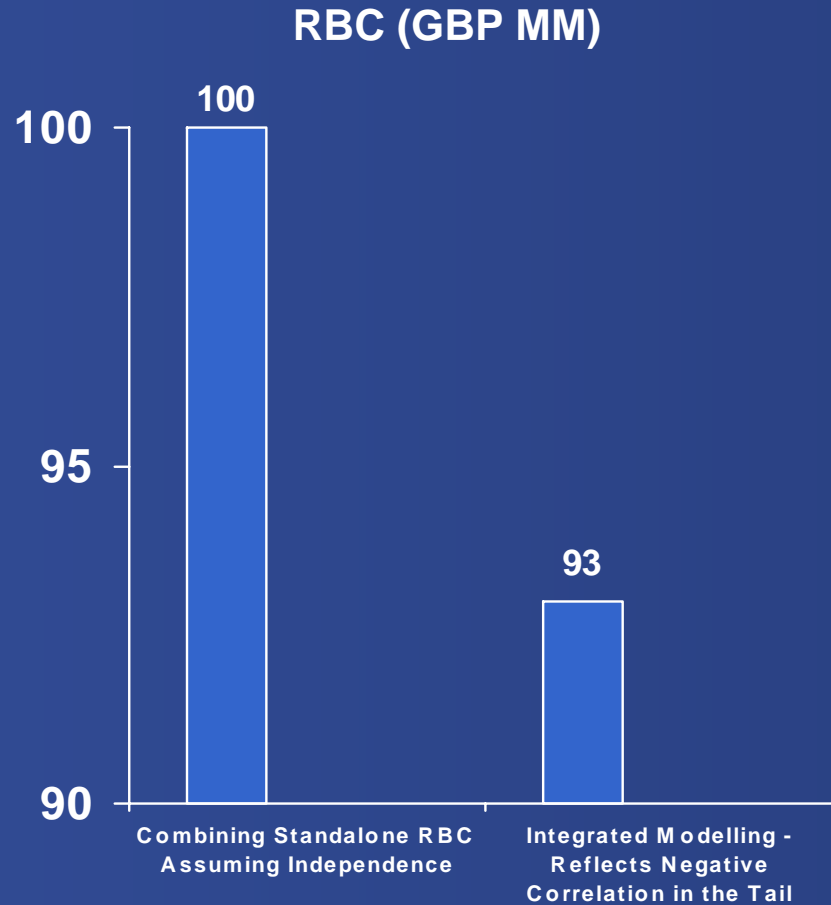
## Stress Testing

- Bottom up "stress tests" (e.g. effect of a severe pandemic) are performed by simple addition of risk type effect, following detailed assessment of each category of loss (e.g. mortality, credit, interest rate and business interruption losses for pandemics)
- Provides a "reality check" on assumed modeled dependencies

# Economic Capital – the Importance of Integrated Modeling

**Case Study : UK Annuity Book with Credit Risky Cash flow Matching Strategy (Credit Composition = Globox Index)**

**Extreme Mortality & Interest Scenarios derived from Low Interest Rate Scenarios**  
**– Negatively Correlated with Extreme Credit Loss Scenarios (High Interest Scenarios)**



Source:

Barrie & Hibbert, February 2007, "Annuity Risk Management : One-Year VAR Decomposition – A Case Study"

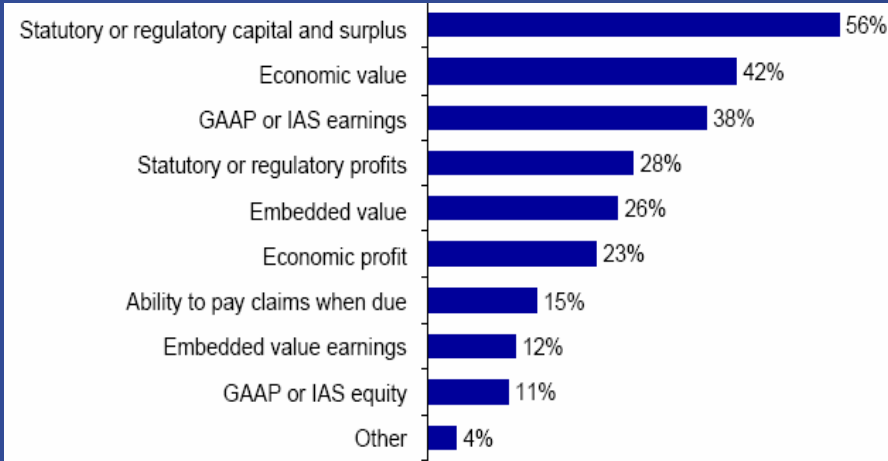


# Dominance of Regulatory Risk Measures Across Global Insurance Industry

Although two thirds of large insurers have economic capital models, fewer companies have truly embedded these in business applications.

## Aggregate Survey Results

When measuring risk, what are the principal financial measures on which the impact of the risk is assessed?  
(Select up to 3)



## Key Regional Differences

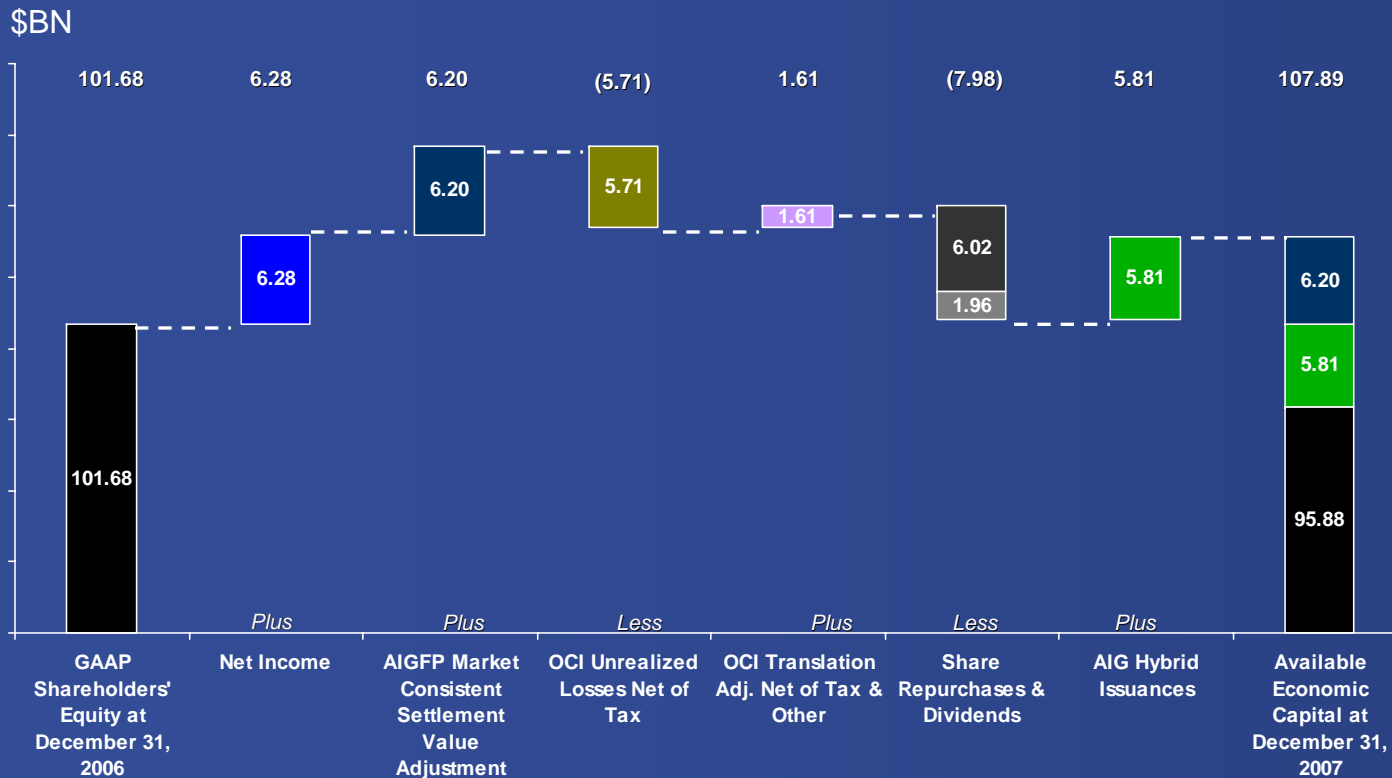
- Most frequently cited financial measures on which the impact of risk is assessed are statutory or regulatory capital and surplus (56%) and economic/embedded value
  - Use of regulatory capital and surplus is most frequently cited by participants in North America (70%) and the U.K. (67%)
  - Life insurers and multi-line companies in North America (75% in each case) were more likely than their European counterparts (58% and 31%, respectively) to focus on statutory or regulatory capital and surplus
  - Results were approximately the same for P&C companies in North America (62%) versus Europe (60%)

Source : Tillinghast, ERM Survey, September 2006

# AIG Disclosures (1 of 3)

## Change in Available Economic Capital

### Year End 2006 to Year End 2007



- Dividends and Share Repurchases (\$8.0 BN) exceeded Hybrid Issuances (\$5.8 billion)
- The AIGFP market consistent settlement value adjustment (\$6.2 BN) was largely offset by OCI unrealized losses (\$5.7 billion)

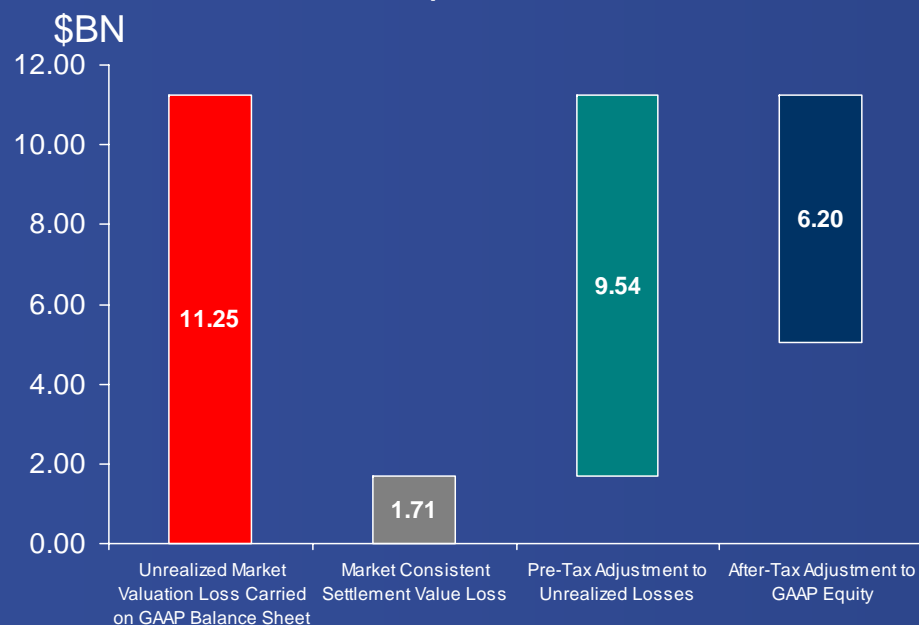
During 2007, AIG's conservative estimate of Available Economic Capital increased by \$6.2 billion (i.e. \$107.9 less \$101.7 billion).

Source: AIG Investor Relations Website, February 2008

## AIG Disclosures (2 of 3)

# Adjustments Made to Unrealized GAAP Market Valuation Loss to Determine Available Economic Capital Under AIG's ECM

Market Consistent Settlement Value Adjustment to Determine Available Economic Capital (December 31, 2007)



- At June 30, 2007 AIG used GAAP equity as a conservative proxy for Available Economic Capital
- For December 31, 2007:
  - AIG will use Market Consistent Embedded Value\* as its estimate of Available Economic Capital for the Life & Retirement Services segment
  - For the General Insurance segment, a consistent approach will be used
  - These valuation approaches are consistent with the market consistent settlement value approach AIG has applied to FP's Super Senior credit derivative portfolio of Multi-Sector CDOs

\* Currently being independently reviewed and certified by Towers Perrin.

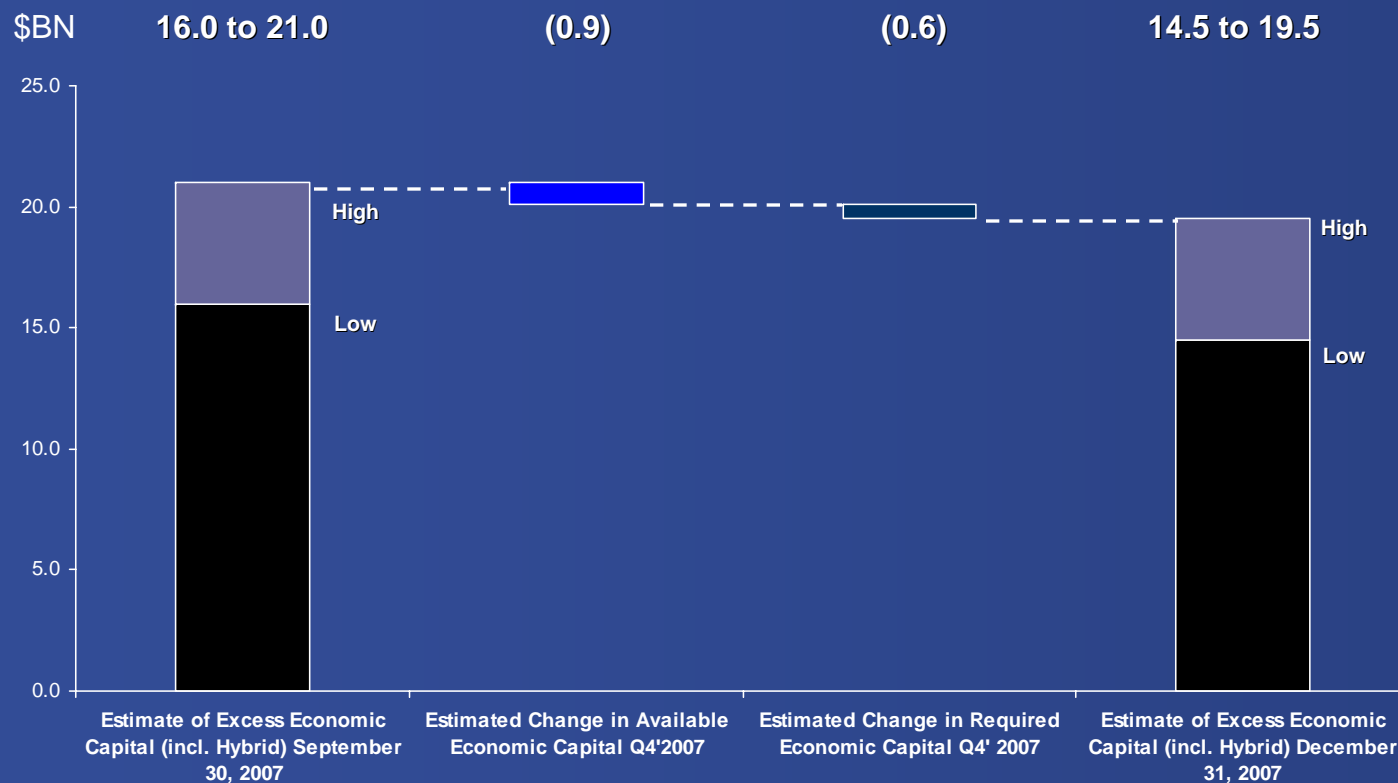
For the purposes of determining Available Economic Capital, AIG believes it is reasonable to make a positive market consistent settlement value adjustment of \$6.2 billion in respect of the AIGFP Unrealized Loss to its GAAP Reported Total Shareholders' Equity as at December 31, 2007.

Source: AIG Investor Relations Website, February 2008

## AIG Disclosures (3 of 3)

### Change in Conservative Estimate of Excess Capital

September 30, 2007 to December 31, 2007



- Estimated Available Economic Capital was reduced by \$0.9 billion in Q4'07, driven by Net Income, Share Repurchases and OCI Unrealized Losses
- Estimated Required Economic Capital increased marginally by \$0.6 billion in Q4'07

AIG's conservative estimate of excess capital has reduced slightly by \$1.5 billion over Q4'07 to a range of \$14.5 to \$19.5 billion as at December 31, 2007<sup>1</sup>. This estimate is based on a roll-forward of the September 30, 2007 disclosure and will be "refreshed" consequent to the full model valuation update at December 31, 2007<sup>2</sup>.

1. Before allowance for an additional \$1 billion that was required to be advanced in January 2008 for share repurchases pursuant to commitments that existed at December 31, 2007.
2. The full model valuation update will use the published results of AIG as at December 31, 2007, as inputs and is therefore expected to be available in May 2008.

Source: AIG Investor Relations Website, February 2008

# AIG's Use of Economic Performance Measures

- *“Commencing in 2008, the economic value added for each of AIG’s business segments will be considered as an element, alongside other existing measures, in the evaluation of senior management performance.”*  
- AIG Investor Relations Website, February 2008